



[7590-01-P]

## NUCLEAR REGULATORY COMMISSION

[NRC-2013-0038]

### Electric Power Research Institute; Seismic Evaluation Guidance

**AGENCY:** U.S. Nuclear Regulatory Commission.

**ACTION:** Endorsement letter; issuance.

**SUMMARY:** The U.S. Nuclear Regulatory Commission (NRC) is issuing an endorsement letter with clarifications of Electric Power Research Institute (EPRI)-1025287, “Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic,” Revision 0, hereafter referred to as the SPID report. This SPID report provides guidance and clarification of an acceptable approach to assist nuclear power reactor licensees when responding to the NRC staff’s request for information dated March 12, 2012, Enclosure 1, “Recommendation 2.1: Seismic.” The NRC staff’s endorsement letter includes additional clarifications on the: 1) use of the Individual Plant Examination of External Events (IPEEE) submittals for screening purposes; 2) development of foundation input response spectra (FIRS) consistent with the site response used in the development of the site-specific ground motion response spectrum (GMRS); 3) updating the seismic source models; and 4) development of the site response.

**ADDRESSES:** You may access information related to this document, which the NRC possesses and is publicly available, by searching on <http://www.regulations.gov> under Docket ID **NRC-2013-0038**.

- **Federal Rulemaking Web site:** Go to <http://www.regulations.gov> and search for Docket ID **NRC-2013-0038**. Address questions about NRC dockets to Carol Gallagher; telephone: 301-492-3668; e-mail: [Carol.Gallagher@nrc.gov](mailto:Carol.Gallagher@nrc.gov).

- **NRC's Agencywide Documents Access and Management System (ADAMS):**  
You may access publicly-available documents online in the NRC Library at <http://www.nrc.gov/reading-rm/adams.html>. To begin the search, select "[ADAMS Public Documents](#)" and then select "[Begin Web-based ADAMS Search](#)." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to [pdr.resource@nrc.gov](mailto:pdr.resource@nrc.gov). The NRC staff's endorsement letter is available under ADAMS Accession No. ML12319A074. The NRC staff's request for information dated March 12, 2012, Enclosure 1, "Recommendation 2.1: Seismic" is available under ADAMS Accession No. ML12053A340.

- **NRC's PDR:** You may examine and purchase copies of public documents at the NRC's PDR, Room O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, MD 20852.

**FOR FURTHER INFORMATION CONTACT:** Mrs. Lisa M. Regner, Japan Lessons-Learned Project Directorate, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone: 301-415-1906; e-mail: [Lisa.Regner@nrc.gov](mailto:Lisa.Regner@nrc.gov).

## **SUPPLEMENTARY INFORMATION:**

### **Background Information**

The endorsement letter for the SPID report is being issued to the public to describe guidance that is acceptable for responding to the request to reevaluate seismic hazards at operating reactor sites, as discussed in Enclosure 1 “Recommendation 2.1: Seismic,” of the NRC staff’s request for information (RFI), “Request for Information Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident,” dated March 12, 2012.

The NRC issued the RFI following the NRC staff’s evaluation of the earthquake and tsunami, and resulting nuclear accident, at the Fukushima Dai-ichi nuclear power plant in March 2011. Enclosure 1 to the RFI requests licensees and holders of construction permits under 10 CFR Part 50, to reevaluate the seismic hazards at their sites using present-day NRC requirements and guidance, and identify actions taken or planned to address plant-specific vulnerabilities associated with the updated seismic hazards. Based on this information, the NRC staff will determine whether additional regulatory actions are necessary to protect against the updated hazards. The principal purpose of the SPID report is to provide guidance for responding to the RFI by describing strategies for screening, prioritization, and potential interim actions, as well as implementation guidance for the risk evaluation that are acceptable to the NRC staff.

### **Basis for Endorsement**

The NRC staff interacted with the stakeholders on development of the SPID report with a focus on screening, prioritization, and implementation details as they relate to performing a seismic reevaluation. The SPID report is the product of significant interaction between the

NRC, Nuclear Energy Institute, EPRI, and other stakeholders at over fifteen public meetings<sup>1</sup> over a 9-month period. These interactions and the insights gained from the meetings allowed for the development of this document in a very short time frame. The meetings helped develop the expectations for how licensees would perform plant evaluations after having updated their seismic hazard information. At each meeting, the NRC staff provided its comments on the current version of the SPID report and discussed with stakeholders subsequent proposed revisions to the document. This iterative process, over several months, resulted in the final version of the document. The NRC staff's endorsement of the SPID report, subject to the additional guidance noted below, is based on this cumulative development process resulting from the extensive interactions between stakeholders and the NRC staff.

The NRC staff has reviewed the SPID report and confirmed that it would provide licensees with the guidance necessary to perform seismic reevaluations and report the results to the NRC in a manner that will address the Requested Information items (1) through (9) in Enclosure 1 of the 50.54(f) letter. The SPID report is intended to provide sufficient guidance for all sites, however, each site is unique and requirements for analysis can vary. In cases where the SPID report may not account for the unique characteristics of a site, prudent and sound engineering judgment should be employed to assure all issues bearing on the hazard and risk evaluations are adequately addressed. Instances when unique site characteristics require such engineering judgment, or require analysis that is not included in the SPID report, should be clearly identified, along with the measures taken to assure the unique site characteristics are appropriately addressed. Although the NRC staff finds that the performance and reporting of the seismic reevaluation in accordance with this document would be responsive to the 50.54(f)

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<sup>1</sup> Public meetings were held on March 1-2, April 2-3, May 15-16, June 14, July 24-25, August 16 and 30, September 11 and 21, October 9 and 18, November 5, 9, 14, 20, and 26, 2012.

letter, there are four further issues described below for which the staff provides additional guidance. These issues are: 1) the use of the IPEEE submittals for screening purposes; 2) development of FIRS consistent with the site response used in the development of the site-specific GMRS; 3) updating the seismic source models; and 4) development of the site response.

#### Use of IPEEE for Screening

Section 3.3 of the EPRI guidance document provides the criteria used to determine if the licensee's previous IPEEE submittal is adequate to use for screening purposes. A seismic assessment performed as part of the IPEEE program that demonstrates a plant capacity that is higher than the new GMRS can be used to screen out plants, provided they meet certain adequacy criteria.

Each licensee has the option of demonstrating the adequacy of its previous IPEEE submittal for screening purposes as part of its response to the 50.54(f) letter. The NRC staff will review each submittal and determine whether the provided information demonstrates the adequacy of the IPEEE analysis and risk insights. The licensee's description of each of the adequacy criteria, described in Section 3.3 of the SPID report, will be reviewed by the NRC staff in its integrated totality, rather than using a pass/fail approach. As such, even if one or more of the criteria are not deemed to be adequate, the NRC staff may still decide that the overall IPEEE analysis is adequate to support its use for screening purposes. The NRC staff may conduct site visits to view IPEEE documentation referenced in support of the IPEEE adequacy submittal.

#### Development of FIRS

The SPID report does not discuss the development of FIRS used for performing soil-structure interaction analyses. Consistent with guidance described in DC/COL-ISG-017,

“Ensuring Hazard-Consistent Seismic Input for Site Response and Soil Structure Interaction Analyses,” the FIRS should be derived in a manner consistent with the site response used in the development of the site-specific GMRS. As such, the FIRS should be derived as performance-based site-specific response spectra at the foundation level in the free field. The starting point for development of the FIRS should be the same hard rock elevation used as the starting point for developing the GMRS. As the engineering properties of soil are strain-dependent and can be highly non-linear, the characterization of soil layers and their associated properties used in the GMRS analysis should also be used for the derivation of the site-specific FIRS at the foundation elevation. The performance-based FIRS can be developed using either a full-column outcrop motion that includes the effect of the soil above, or as a geologic outcrop motion for which the soil layers above the foundation elevation have been removed.

Updating the Central and Eastern United States (CEUS)-Seismic Source  
Characterization (SSC) model

Section 2.2 of the SPID report provides an overview of the CEUS-SSC model and explains why it is appropriate to use without update for the seismic reevaluations. Specifically, Section 2.2 states “for site-specific licensing applications or site-specific safety decisions, these seismic sources would be reviewed on a site-specific basis to determine if they need to be updated. Such evaluations would be appropriate in a licensing application, where focus could be made on site-specific applications. However, for a screening-level study of multiple plants for the purpose of setting priorities, the use of these seismic sources as published is appropriate.”

The NRC staff agrees that the CEUS-SSC model does not need to be updated for the seismic reevaluations, but the staff’s rationale is different than that presented in the SPID report. Specifically, the staff has determined that the CEUS-SSC model does not need to be updated

because the model is up-to-date and is sufficiently refined to allow a site-specific source model to be developed. To adequately respond to the 50.54(f) letter, a site-specific GMRS should be calculated for each plant so that an informed decision can be made regarding which plants will be required to complete a risk evaluation. Further, the site-specific GMRS will also be used in the risk evaluations.

Prior to issuing the CEUS-SSC model, the Technical Integration Team considered potentially significant events (such as the 2011 Mineral, VA earthquake) that had occurred after the model was developed, and determined that those events did not change their interpretations of seismic sources or earthquake recurrence rates. If a significant earthquake in the CEUS were to occur or new information were to emerge during the reevaluation period that could require an update of the CEUS-SSC model, the staff expects licensees to evaluate the significance of the new information to determine if the CEUS-SSC model needs to be updated in order to appropriately respond to the 50.54(f) request.

#### Site Response

Section 2.4.1 and Appendix B of the SPID report provides guidance on how to develop the site response in cases where limited site response data exists. As stated in Appendix B, the NRC staff expects licensees to use available geologic, geotechnical, and geophysical data collected during the initial licensing or subsequent activities at the site to the extent practicable. Where limited site response data exists, information from core borings and data collected from site and regional evaluations should be used to develop the site response amplification. Section 4 of the SPID report states that licensees should provide the basis for the site responses used in the reevaluations. The NRC staff expects site-specific geology, geotechnical, and geophysical information to be a significant part of the basis.

#### Non-concurrence

An NRC staff member did not agree with some content of the SPID report and submitted a non-concurrence on the SPID endorsement letter. In accordance with the NRC's non-concurrence process, NRC management and staff worked to address the staff member's concerns, and documentation of the non-concurrence can be found in ADAMS at Accession No. ML12324A195.

#### 60-Day Response

In accordance with the 50.54(f) letter, each licensee is to submit to the NRC its intention to follow the NRC-endorsed seismic reevaluation guidance, or an alternative approach, 60 days after the issuance of the NRC-endorsed guidance. For the purpose of meeting this deadline, the 60-day response period commences on the date the endorsement letter is published in the *Federal Register*.

#### **BACKFITTING AND ISSUE FINALITY**

This endorsement letter does not constitute backfitting as defined in 10 CFR 50.109 (the Backfit Rule) and is not otherwise inconsistent with the issue finality provisions in Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," of 10 CFR. This endorsement letter provides guidance on an acceptable method for implementing the March 12, 2012, RFI. Applicants and licensees may voluntarily use the guidance in the SPID report, as clarified by the NRC staff in the endorsement letter, to comply with the RFI. Methods, analyses, or solutions that differ from those described in the SPID report may be deemed



acceptable if they provide sufficient basis and information for the NRC staff to verify that the proposed alternative is acceptable.

#### **CONGRESSIONAL REVIEW ACT**

This endorsement letter is a rule as designated in the Congressional Review Act (5 U.S.C. 801-808). The Office of Management and Budget has found that this is a major rule in accordance with the Congressional Review Act.

Dated at Rockville, Maryland, this 15<sup>th</sup> day of February 2013.

FOR THE NUCLEAR REGULATORY COMMISSION

David L. Skeen, Director  
Japan Lessons-Learned Project Directorate  
Office of Nuclear Reactor Regulation